

Ward #11
Ward #11
132 DuPont Hall

Newark, Delaware

August 7, 1971

Mr. Frank Landa
315 W Chestnut Hill Rd.
Newark, Delaware

Dear Mr. Landa:

Please find enclosed copies of the analysis of your sand samples as requested 7_20-71. Table I shows the results of our analysis on your sand and Table II shows the results of the analysis on the pond water for the last month. Table II also shows normal values of the parameters previous to the time that leachate from the landfill at Tybouts Corners drained into the ponds that you use for washing your sand.

As can be seen from Table II, BOD₅, chlorides (Cl⁻), and hardness have all increased markedly in the ponds over the last month. If one were to look for contamination of your sand, as I was asked by you to do, then one would expect to see these parameters increase in your sand in a similar fashion. From Table I, comparing samples 1, 2, and 3 with sample 4, it is obvious that BOD₅, chlorides, and hardness are all higher for the sand that was washed on July 19 and 20, 1971 than for the sand washed prior to July 1, 1971. This indicates that the sand just washed is definitely contaminated by the wash water. However, it can be seen that the difference between the BOD₅, chlorides, and hardness for samples 1 and 2 versus sample 3 is great. This says to me that the twenty four hours of stockpiling the sand greatly reduces the wash water contamination.

I have calculated an organic sediment index(OSI) for the various sand samples. The OSI is a new, yet

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relatively reliable parameter to indicate pollution of streams, based on the chemical characteristics of the sediments. All of the sand samples seem to have about the same OSI (Table I), indicating that the washed sand is no more polluted than a clean creek sand.

The coliform counts for the samples were difficult to determine because of the presence of a slime layer on the filter papers. However, it can be concluded from the coliform counts that all samples collected were polluted.

CONCLUSIONS

The conclusions that I draw from this data are as follows:

- 1). Your sand is definitely being contaminated in the washing process.
- 2). This contamination is reduced markedly if the sand is stockpiled for at least 24 hours.
- 3). The level of contamination appears to be only slightly worse than that experienced before the increased leaching from the landfill.
- 4). The washed sand has about the same, or slightly less contamination than clean creek sand.
- 5). The coliform counts are high for all samples, and any use of the sand in which ingestion of the sand by a human could occur, such as using the sand in childrens' sand boxes, should be avoided.
- 6). The mason sand appears to be more contaminated than the concrete sand.

RECOMMENDATIONS

My recommendations are as follows:

- 1). Stockpile the concrete sand for at least 48 hours and provide adequate drainage such that the washwater remaining in the sand may drain.
- 2). Stockpile the mason sand a minimum of 96 hours with adequate drainage.
- 3). Do not sell any of the sand for sand boxes at any time.

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- 4). Advise your employees to wash thoroughly with an antiseptic soap after working with the wash water or the wet sand, and particularly before eating.

I feel that the recommended actions will minimize or negate any possibility of public health hazard due to the contamination of your sand. If I can be of any further assistance, please feel free to contact me.

Sincerely,

Larry L. Olson

Larry L. Olson, PhD.
Assistant Professor

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Table I. Results of Analysis on Sand Samples* Collected at Tybouts Corners on July 20, 1971. Reported August 7, 1971.

| Sample ⁺⁺ | BOD ₅ (mg/l) | Hardness NO ₃ ⁻ (mg/l as CaCO ₃) | Cl ⁻ (mg/l) | Organic Nitrogen (%) | Organic Carbon (%) | Total P (%) | OSI ⁺ x10 ⁶ | Coliforms (colonies/100 ml) | |
|----------------------|----------------------------|---|---------------------------|-------------------------|-----------------------|----------------|--------------------------------------|--------------------------------|-----------|
| | | | | | | | | 1 day | 4½ days |
| 1 | 67 | 65 | 26 | .00042 | .0125 | .00605 | 5.25 | 3,000 | 300,000 |
| 2 | 50 | 40 | 19 | -- | .0045 | .00710 | -- | TMC** | 700,000 |
| 3 | 9 | 60 | 8 | .00084 | .0045 | .00775 | 3.75 | 105,000 | 1,400,000 |
| 4 | 4 | 25 | 3 | .00105 | .00753 | .00735 | 7.92 | 40,000 | 3,000,000 |
| 5 | 39 | 60 | 9 | .00021 | .0316 | .00660 | 6.52 | 2500,000 | 2,650,000 |

* BOD₅, Hardness, NO₃⁻, Cl⁻, and Coliform were all determined on the resultant solution when one volume of distilled water was mixed with one volume of wet sand.

+ Organic Sediment Index (OSI) = Organic Nitrogen X Organic Carbon

** Too Many To Count @ 1:1000 dilution

++ Sample 1 --Mason sand, from washing belt.

Sample 2 --Concrete sand, from washing belt.

Sample 3 --Concrete sand, 24 hours in pile.

Sample 4 --Concrete sand, prior to anaerobic pond condition.

Sample 5 --Clean creek sand from under bridge upstream of landfill.

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| Parameter | Samples | | | | | | "Normal Value" |
|--|---------|----------------------------|---------|---------|---------|---------|------------------|
| | Pond #3 | Leachate along North Fence | Pond #2 | Pond #3 | Pond #2 | Pond #3 | |
| Sample Date | 7-12-71 | 7-20-71 | 7-20-71 | 7-20-71 | 7-28-71 | 7-28-71 | 7-28-71 |
| pH | 6.9 | 6.4 | 6.6 | 6.7 | 6.7 | 6.8 | 6.5 + 7.2 |
| Nitrate (mg/l) | 0.2 | 0.8 | 0.3 | 0.1 | 0.12 | 0.08 | 0.2 + 2.0 |
| Specific Conductance (micro-mho/cm) | 250 | 500 | 350 | 400 | 250 | 280 | 150 |
| BCO ₃ (mg/l) | 240 | 820 | 250 | 250 | 165 | 189 | 3 + 9 |
| Hardness (mg/l as CaCO ₃) | 178 | 1000 | 180 | 176 | 190 | 225 | 30 + 60 |
| Chloride (mg/l as Cl ⁻) | 46 | 53 | 63 | 62 | 70 | 74 | 15 + 25 |
| Coliform (colonies/100 mL) | 62,000 | — | — | — | 27,000 | 2000* | 10,000 + 100,000 |
| Chlorine demand (mg/l as Cl ₂) | 37 | 91 | 13 | 25 | 13 | 23 | — |
| D. O. (mg/l) | 0.8 | — | — | — | — | — | 7 - 10 |
| Color | black | black | brown | gray | brown | black | brown |

* Cl₂ added to pond 1 hour before sample collection.

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